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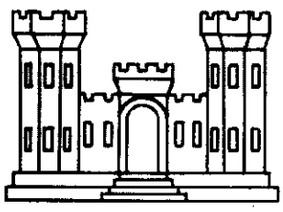
SURVEY (REVIEW OF REPORTS) OF

CAMDEN HARBOR

MAINE



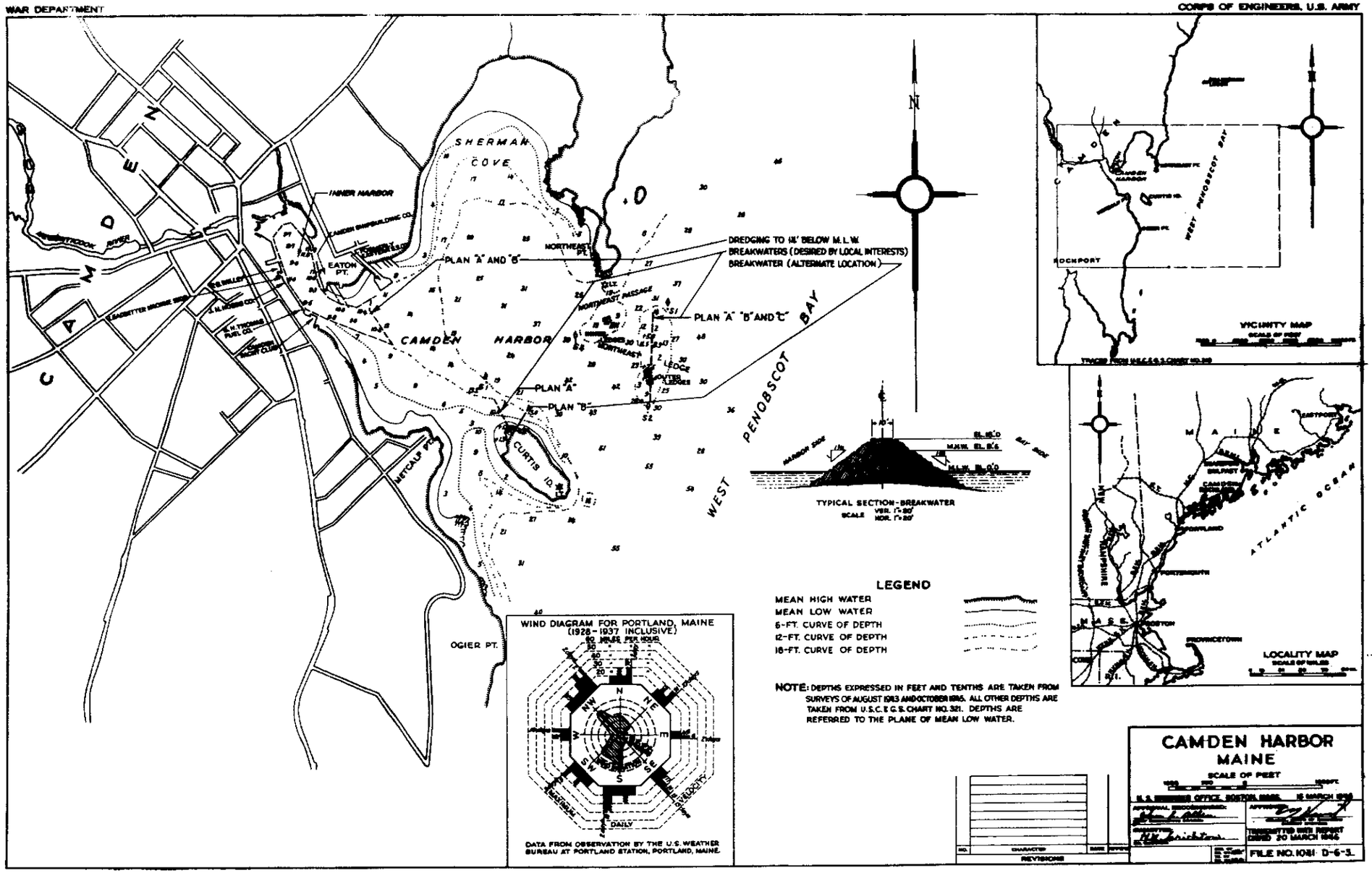
AUTHORITY - THIS REPORT IS SUBMITTED IN COMPLIANCE WITH RESOLUTION ADOPTED 15 JUNE 1943. BY THE COMMITTEE ON RIVERS AND HARBORS OF THE HOUSE OF REPRESENTATIVES, U. S. A.

U. S. ENGINEER OFFICE
BOSTON, MASS.
20 MARCH 1946.

COPY NO. 6

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



CAMDEN HARBOR
MAINE

SCALE OF FEET

U.S. ENGINEER OFFICE, BOSTON, MASS., 15 MARCH 1946

TRANSMITTED WITH REPORT DATED 20 MARCH 1946

REVISIONS

FILE NO. 1081-D-6-3.

SURVEY (REVIEW OF REPORTS) OF
CAMDEN HARBOR, MAINE

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Syllabus

The district engineer is of the opinion that Camden Harbor, Maine is worthy of improvement by the construction of a breakwater on the Outer Ledges. He believes, however, that the resultant benefits would not be sufficiently general in character to warrant the United States in undertaking the improvement unless local interests would contribute one-third of the initial cost. Local interests feel, however, that in view of the expenses incurred in repairing damage caused by the autumn storms of 1944 and 1945, and in dredging during the last three years, that they cannot contribute money toward the construction of a breakwater at this time. Accordingly, no additional improvement of Camden Harbor, Maine, in the interest of navigation or national defense, is recommended at this time.

War Department,
United States Engineer Office,
Boston 16, Massachusetts,
20 March 1946.

Subject: Survey (Review of Reports) on Camden Harbor, Maine.

To: The Chief of Engineers, U. S. Army, Washington, D. C., through the Division Engineer, New England Division, Boston 10, Mass.

1. Authority.- This report is submitted in compliance with the following resolution adopted 15 June 1943 by the Committee on Rivers and Harbors of the House of Representatives, United States Congress:

> RESOLVED BY THE COMMITTEE ON RIVERS AND HARBORS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors created under section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the reports on Camden Harbor, Me., submitted October 27, 1932, and previous reports, with a view to determining if it is advisable to provide additional improvements in the interest of navigation and national defense.

2. Reports under review.- The specific report under review was authorized by the River and Harbor Act of July 3, 1930. The preliminary examination report, which was submitted on 10 October 1930,

recommended a survey to determine the cost of a channel 17 feet deep at mean low water and of suitable width from the entrance to a point opposite the wharf of the Eastern Steamship Lines, Inc. The survey report was submitted on 15 January 1932 by the district engineer and was unfavorable to deepening the outer harbor to 17 feet at mean low water. This conclusion was based on the fact that the improvement would be of benefit mainly to local interests, the effect on general commerce would be small, and lacking any prospects of a proper contribution ($15,000, or 50% of estimated cost) from local interests was not worthy of being undertaken by the Government. The estimated cost of providing an adequate approach area with a depth of 17 feet at mean low water to the wharf of the Eastern Steamship Lines, Inc. was $30,000, with estimated cost of annual maintenance $500. The unfavorable report, which was not published, was concurred in by the division engineer and the Board of Engineers for Rivers and Harbors.

3. Description.- Camden Harbor is located on the westerly side of West Penobscot Bay, about 8 miles north of Rockland, 88 miles northeast of Portland, and covers an area of about 50 acres. A small stream, the Megunticook River, empties into the upper end of the harbor. The outer harbor is easy of access and affords good anchorage in depths ranging from 14 to 30 feet. The inner harbor has been dredged to 10 feet in depth to form an anchorage for small pleasure craft. The mean tidal range is 9.6 feet and the spring range is about 2 feet greater. There are no bridges over the locality covered in this report and no questions of water power, flood control, or other special subjects are involved. The locality is shown on U. S. Coast and Geodetic Survey Charts Nos. 310, 321 and 1203, and on the map accompanying this report.

4. Tributary area.- The town of Camden, located on the inner harbor, is an important yachting center. In 1940 it had a population of 3,554, with estates valued at $4,358,084. During the summer months the

population is greatly increased by summer residents and tourists. There are no railroad facilities at Camden, but it is served by an adequate bus line which connects with the Maine Central Railroad in Rockland. The Camden Shipbuilding and Marine Railways Company enlarged its yard during the recent emergency and furnished employment to a substantial number of people, many of whom migrated from other parts of the state. A. L. Anderson and Leadbetter's Machine Shop each have facilities for repairing and storing all types of motor and sailing vessels. Several woolen goods manufacturers employ many of the townspeople, and the business of supplying the many and varied needs of yachtsmen and tourists is a source of income to a great many residents. The Vagabond Cruises, consisting of eight sailing schooners, carry passengers on weekly cruises and make Camden their home port. The Eastern Steamship Company discontinued service to Camden in 1935. Since then all freight has been brought in by truck, except coal, which is brought in by barges when bottoms are available.

5. Prior reports.- In addition to the reports mentioned in paragraph 2 the following reports have been made on Camden Harbor:

Work to be done	Date	Recommendation
Dredging 7-foot channel on east side and 3-foot channel on west side of harbor.	1872	Favorable
Deepening entrance channel to 12 feet, the main portion of harbor to 10 feet, and small channels in upper harbor to 5 feet.	1888	Favorable
Dredging an area in front of Boston and Bangor Steamship Company to 14 feet.	1899	Favorable
Dredging additional area in upper harbor to 10 feet.	1908	Favorable
Construction of breakwater from mainland to Negro Island.	1911	Unfavorable
Deepening harbor to 17 feet.	1920	Unfavorable
Deepening harbor to 17 feet.	1927	Unfavorable

6. Existing project.- The existing project for Camden Harbor provides for a channel 14 feet deep at mean low water in the outer harbor and 10 feet deep in the main and upper portion of the harbor. The project was authorized by the following River and Harbor Acts: The Act of August 11, 1888 provided for dredging at the entrance to 12 feet at mean low water, dredging the main portion of the harbor to 10 feet, and small channels in the upper portion to 5 feet at mean low water; the Act of June 13, 1902 provided for dredging an area in the vicinity of the steamboat wharf in the outer harbor to 14 feet at mean low water; the Act of June 25, 1910 provided for dredging an area in the upper part of the harbor to 10 feet at mean low water. The existing project was completed in 1911. Maintenance dredging to restore project depths was completed in 1929. The total expenditures under the existing and previous projects to 30 June 1945 have been $133,475.56 of which $102,400 was for new work and $31,075.56 for maintenance.

7. Local cooperation.- No local cooperation has been prescribed in connection with the existing project for Camden Harbor, Maine.

8. Other improvements.- The Camden Shipbuilding and Marine Railways Company dredged a berth in their fitting-out pier to a depth of 16 feet at mean low water in 1943. Additional dredging was done in 1944 to extend this berth.

9. Terminal and transfer facilities.- There are eight wharves on the inner harbor at Camden, seven of which have depths of 4.2 to 9.6 feet at mean low water, while the eighth has depths of about 16 feet. Six of these facilities are used for the handling of general supplies, one is used by a yacht club for pleasure craft, and one is owned by a shipyard with a marine railway used for building and repairing vessels up to 250 feet long. There are also four wharves which can be used only at high tide. There is one wharf on the outer harbor with a depth of 11 to 13.6 feet at mean low water, formerly used by the Eastern Steamship

Company for the discharge of freight and passengers, the use of which was discontinued in 1935.

10. Improvement desired.- A public hearing was held at Camden, Maine on 21 June 1945 in order to obtain the views of interested parties concerning the improvement desired. The hearing was well attended with representatives of the town, the Chamber of Commerce, the local shipbuilding company, local business and industry, and citizens of the town and summer residents being present. The interested persons in the town of Camden had appointed a committee to ascertain what improvements are desired and to present their views.

11. The improvements desired by the proponents consist of dredging the inner and outer harbors to a minimum depth of 14 feet at mean low water, of constructing a breakwater across the Outer Ledges at the harbor's entrance, and of constructing a second breakwater extending from the northern end of Curtis Island in a northwest direction.

12. The dredging was stated to be necessary "to provide ample clearance for large crafts coming into our wharves, and to protect reoccurrence of the damage suffered in the storm of 1944 amounting to approximately $75,000.00". It was asserted that "A breakwater is necessary to protect shore property from storms, and to provide a safe and more attractive anchorage for yachts and commercial craft".

13. It was brought out that the storms causing the greatest damage are from the southeast.

14. At the hearing local interests said that no financial aid could be contributed either by local government or other public or private interests, as approximately $20,000 has been spent by local interests for dredging during the last three years. In reply to letters concerning the contribution of funds for the improvement, the position of local interests in this respect was confirmed by letter dated 7 March 1946 wherein they stated that because of expenses incurred in repairing damage caused

by the autumn storms of 1944 and 1945 and in dredging in the last three years, they do not feel that they can put money into the construction of breakwaters at this time.

15. Commerce.- The principal commodities which normally make up the waterborne commerce of Camden Harbor are coal and petroleum products. The tonnage of waterborne commerce and the number of passengers handled at this port during the period 1939 through 1945, are shown in the following tabulation:

Year	Tons	Passengers
1939	8,157	(1)
1940	7,137	
1941	6,481	
1942	4,744	
1943	4,268	
1944	(2)	1,100(3)
1945	(2)	2,690

(1) Discontinued until 1944.
(2) None reported.
(3) Informal report of 1,100 passengers carried was received subsequent to submission of 1944 report on commercial statistics.

16. Trips and drafts of vessels.- Although there were no commodities reported shipped in or out of Camden Harbor for the calendar year 1945, there were reported one vessel with a draft of 15 feet; two trips of vessels with drafts of 12 to 14 feet; 11 trips of vessels with drafts of 8 to 10 feet; 5 trips of vessels with drafts of 6 to 8 feet; and 52 trips of vessels with drafts under 6 feet. These 71 vessels, having an estimated net registered tonnage of 2,767 tons, used the facilities at Camden for commercial repairs. In addition, there were 81 trips of schooners with drafts of from 6 to 12 feet, and a net registered tonnage of 2,685 tons, using the harbor for the carrying of vacation parties on summer cruises. These schooners operated from the first of June to October, coming in and out of the harbor on weekends.

17. Difficulties attending navigation.- According to local interests the principal difficulty in navigating vessels in the waterway

arises from the lack of sufficient depth of water to permit moving in and out of the harbor at all times. Coal barges and other vessels are delayed in moving in to the wharves in the inner harbor while awaiting high tide. According to local interests boats moored in the outer harbor have to be removed to the inner harbor during storms in order to protect them. It is also claimed that it is uncomfortable to remain at anchor in the harbor due to the undertows coming into the harbor.

18. Survey.- A detailed sounding survey of the existing project was made in August, 1943 and portions were resurveyed in October, 1945. Sounding surveys of the areas covering the locations of the proposed breakwaters were made in October, 1945. The results of these surveys are shown on the accompanying map marked "Camden Harbor, Maine, File No. 1041, D-6-3".

19. Plan of improvement.- Three plans of improvement have been considered in the present report and are indicated on the accompanying map.

Plan A includes the improvements desired by local interests as follows:

(a) Dredging inner harbor to a depth of 14 feet at mean low water.

(b) Construction of a rubblestone breakwater about 1,100 feet long, to elevation 15 feet above mean low water, with a top width of 10 feet on the Outer Ledges.

(c) Construction of a rubblestone breakwater about 800 feet long, to elevation 15 feet above mean low water, with a top width of 10 feet extending in a northwesterly direction from Curtis Island.

Plan B consists of Items (a) and (b) of Plan A, with the breakwater location under Item (c) changed to a northeasterly direction and extending only 200 feet from Curtis Island.

Plan C, which is considered the most feasible plan of improvement, consists only of Item (b) of Plan A.

20. The estimated quantities and costs involved in the three plans of improvement are indicated below.

Estimated Quantities and Costs

Plan A:	
(a) Dredging Inner Harbor, 113,600 cu. yds. @ 70¢	$ 79,520
(b) Breakwater, Outer Ledges, 42,560 tons @ $5.00	212,800
(c) Breakwater, northwest of Curtis Island, 48,000 tons @ $5.00	240,000
Total, Plan A	$532,320
Plan B:	
(a) Dredging Inner Harbor, 113,600 cu. yds. @ 70¢	$ 79,520
(b) Breakwater, Outer Ledges, 42,560 tons @ $5.00	212,800
(c) Breakwater, northeast of Curtis Island, 12,700 tons @ $5.00	63,500
Total, Plan B	$355,820
Plan C:	
(a) Breakwater, Outer Ledges, 42,560 tons @ $5.00	$212,800
Total, Plan C	$212,800

21. The above estimates include engineering and contingency costs. Dredging quantities are in terms of place measurement, with an allowance of one foot for overdepth. The unit price for dredging is based on the disposal of excavated material at sea.

22. Aids to navigation.- No additional aids to navigation are contemplated.

23. Analysis of economic justification.- The proposed improvement would afford considerable benefits to navigation and would, it is believed, warrant favorable action on the part of the Federal and local

governments. The latter, it is believed, should contribute one-third of the original cost of the improvement, in view of the amount of local benefits to be expected.

24. The economic cost of the project, expressed as an annual carrying charge and based on an assumed life of 40 years, is given below.

	Plan A	Plan B	Plan C
(a) Federal Investment:			
(1) Estimated cost of new work	$532,320	$355,820	$212,800
(2) Less funds to be contributed	177,440	118,600	70,900
(3) Total Federal Investment	$354,880	$237,120	$141,900
(b) Federal Annual Carrying Charge:			
(1) Interest at 3% on Item (a)(3)	$ 10,646	$ 7,114	$ 4,257
(2) Amortization of Item (a)(3) (40 years at 3%)	4,706	3,144	1,882
(3) Estimated cost of annual maintenance by Engineer Department	2,000	2,000	-0-
(4) Total Federal Carrying Charge	$ 17,352	$ 12,258	$ 6,139
(c) Non-Federal Investment:			
(1) Funds to be contributed	$177,440	$118,600	$ 70,900
(2) Total Non-Federal Investment	$177,440	$118,600	$ 70,900
(d) Non-Federal Annual Carrying Charges:			
(1) Interest at 3½% on Item (c)(2)	$ 6,210	$ 4,151	$ 2,482
(2) Amortization of Item (c)(2) (40 years at 3½%)	2,099	1,403	839
(3) Total Non-Federal Annual Carrying Charges	$ 8,309	$ 5,554	$ 3,321
(e) Total Annual Carrying Charges:			
(1) Federal Annual Carrying Charges	$ 17,352	$ 12,258	$ 6,139
(2) Non-Federal Annual Carrying Charges	8,309	5,554	3,321
(3) Total Annual Carrying Charges	$ 25,661	$ 17,812	$ 9,460

25. Estimate of Benefits.- The chief benefits to be expected from the improvement of Camden Harbor are protection to property from storms, increased safety and convenience to recreational and commercial navigation, and the expansion of yachting activity and the commercial activity associated therewith.

26. Considerable damage to shore properties has occurred yearly and during the storms of 1944 is estimated by local interests to have been about $75,000. The construction of the desired breakwater is expected to materially reduce these losses. The average annual loss from this source is estimated to be about $5,000.

27. The proponents of the improvement conservatively estimate that approximately 300 transient yachts and other pleasure craft now use the waterway during the spring, summer and fall, and approximately $69,400 is spent annually for supplies and services. They also estimate that 75 local yachts ranging in size from 25-foot power and sailing vessels to 125-foot motor yachts drawing up to 13 feet use the harbor each season and that the average annual expenditure for supplies, equipment, repairs and storage is $81,200. While Camden and the immediate vicinity are the chief beneficiaries of this business, there are further and widespread benefits accruing to those distant localities furnishing the supplies sold in Camden.

28. With the general increase in recreational boating that is expected to occur during the next few years, it is conservatively estimated that the amount spent by transient yachts will be increased by about $40,000 if the harbor is made attractive to such craft. It is believed that additional yachts will make Camden their home port if the improvement is made and that as a result the average annual expenditure from this source will be increased by about $20,000. The total estimated increased business at Camden would be about $60,000. Assuming a 10% return to the community on this business, taking into account the secondary effect such business has on the general commercial activity of the town, the estimated benefit from the increased recreational business is about $6,000. The total direct estimated benefits would be $11,000 in addition to which there would be intangible benefits such as those accruing through prevention of accidents and storm damage to recreational and

commercial craft, and also the use of this harbor for refuge during storms.

29. Comparison of benefits and costs.- The estimated annual direct benefits of $11,000 and the estimated annual carrying charges of $9,460 give a ratio of benefits to charges of 1.16 to 1. In addition, there are intangible benefits that serve to further increase the ratio.

30. Discussion and conclusions.- Camden Harbor is an important yachting center and is frequented by many yachts and small craft during the summer season. It has an outer harbor of ample area, and anchorages ranging from 14 to 30 feet, together with an inner harbor which is well protected and with depths of about 10 feet at mean low water. The outer harbor is easy to make but is quite active so that it is a rather uncomfortable mooring for smaller vessels.

31. In 1872, when the first report on Camden Harbor was made, the harbor had commercial traffic amounting to 54,359 tons annually, while in 1909 this had increased to 415,289 tons. Subsequently this traffic has decreased until it is now practically limited to receipt of coal and petroleum products aggregating about 7,000 tons on the average in normal times. However, as there is no railroad connection to Camden, this traffic is important to the town as it represents the means of receiving cheap fuel for the community.

32. In connection with the receipt of coal, local interests assert that, because of lack of sufficient depths in the inner harbor, coal barges are especially delayed while awaiting high tide to be able to move to their berths at the wharves. However, as the berths at the wharves are no deeper than other depths in the inner harbor, the delay cannot be solely attributed to these existing depths. It has been the custom to bring in barges drawing up to 16 feet at high water stages and to permit the barges to ground out as the water lowered. This practice has been possible because of the soft bottom at the berths.

33. The only dredging by local interests was the dredging of the fitting-out berth by the Camden Shipbuilding and Marine Railway Company. In that instance the dredging had to be accomplished by the company as it is not the policy of the Federal Government to dredge berths for private parties. It was found that after providing the berth, the company was able to carry on its

operations with a minimum of delays due to the depths in the rest of the harbor. Unless local interests provided similar berths at the other wharves engaged in commercial activities, there would not appear to be sufficient reason for the Government to participate in other improvements of the inner harbor.

34. Subsequent to the hearing of 21 June 1945, the necessity for increasing the depth in the inner harbor to 14 feet at mean low water was determined by local interests to be unnecessary at this time. By letter dated 7 March 1946 they stated "at the present time it seems probable that the depths of 10 feet in the inner harbor and 14 feet in the outer harbor would be sufficient. The industry, which a year ago planned to serve larger boats have changed their plans".

35. The lack of greater depths in the inner harbor probably does not have as great an adverse effect on the yachting activity as does the condition in the outer harbor where the movement of the water is such as to render it uncomfortable to remain at anchor. Because of this, many vessels that would otherwise remain at Camden to take advantage of the service facilities available there, now find it desirable to seek other harbors to spend the night. The exact amount of reduction in the undertow that will be secured by breakwater construction is impossible to determine prior to construction. However it is expected that the recommended breakwater will alleviate this condition.

36. The damage to shore properties and wharves due to storms has been appreciable in the past two years. It has been the result of a combination of unusually high tides occurring simultaneously with storms from the southeast and east. During such storms, vessels must be removed from the outer harbor. According to local interests, damage due to storms in 1944 amounted to approximately $75,000. The storms of November 1945 caused further damage of about $25,000. The cost of replacement would be somewhat greater due to the poor condition of some of the structures prior to the storms.

37. The construction of a breakwater 1,100 feet long located in a north-south direction on the Outer Ledges, as desired by local interests and considered the best plan under study herein, would serve to protect both the inner and outer harbors against storms from the east. Because

of the favorable depths on the ledges, the amount of stone required is not great, as compared with the length of the breakwater.

38. The local interests suggest a breakwater running in a generally northwest direction from Curtis Island. This breakwater, about 800 feet long, would require about the same quantity of stone as that proposed on the Outer Ledges. Its location, however, is such that it would afford no protection against southeast storms and but little from the easterly storms.

39. If a breakwater were to be constructed off Curtis Island to protect against southeast storms, the ideal direction would be southwest or northeast. A breakwater between Curtis Island and the mainland in a southwest direction has been adversely reported on previously for the reason that there was considerable local opposition and also because of the questionable benefits to be derived. A study has been made of a breakwater extending in a northeast direction from the northerly end of Curtis Island. A breakwater only 200 feet long, extending to the 12-foot contour as does the northwest breakwater, would give more protection against southeast storms and almost as much against easterly storms. While this breakwater has the advantage of requiring only 12,800 tons of stone, the benefits to be secured do not appear to warrant its construction.

40. Plan A represents the desires of the proponents of the improvement. The annual carrying charges of $25,661., as set forth in paragraph 24, are believed to exceed the annual benefits to be derived from the improvement. Plan B, which would afford approximately the same protection at a third less cost, does not appear to be warranted either.

41. Plan C, which would involve a cost of approximately four-tenths the cost of Plan A, appears to represent the most feasible plan which would approach the desires of local interests. The breakwater on the Outer Ledges would be of value in protecting shore properties from storm damage, as well as moderating the undesirable undertow that now detracts

from the attractiveness of the harbor. It is believed that Plan C will result in benefits that are comparable with the costs involved.

42. In view of the character of the benefits to be secured, the district engineer is of the opinion that the United States would not be warranted in undertaking the improvement without financial contributions by local interests commensurate with the local benefits involved. Local interests, however, state that in view of the expenditures incurred in repairing damage caused by the autumn storms of 1944 and 1945, and in dredging during the last three years, they cannot put any money into the construction of breakwaters at this time.

43. Recommendation.- In view of the above, the district engineer recommends no additional improvement of Camden Harbor, Maine, in the interest of navigation and national defense, at the present time.

C. T. HUNT,
Colonel, Corps of Engineers,
District Engineer.

Inclosure:
Map

SUBJECT: Survey (Review of Reports) on Camden Harbor, Maine

NEDGW
(20 Mar 46)

1st Ind.

CAT/phw

Division Engineer, New England Division, Boston 10, Mass., 5 April 1946

TO: The Chief of Engineers, U. S. Army, Washington 25, D. C.
ATTENTION: SPEWR

I concur in the unfavorable recommendation of the District Engineer.

D. L. WEART
Major General, U.S.A.
Division Engineer

1 Incl.: n/c

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

CAMDEN

MEGUNTICOOK RIVER

INNER HARBOR

CAMDEN SHIPBUILDING CO.

FORMERLY EASTERN S.S.CO.

EATON PT.

P.G.WILLEY

J.H.HOBBS CO.

LEADBETTER MACHINE SHOP

G.H.THOMAS FUEL CO.

CAMDEN YACHT CLUB

SHERMAN COVE

CAMDEN HARBOR

NORTHEAST PT.

NORTHEAST PASSAGE

LT.

BN

INNER LEDGES

NORTHEAST LEDGE

OUTER LEDGES

PLAN "A" AND "B"

PLAN "A"

PLAN "B"

PLAN "A" "B" AND "C"

DREDGING TO 14' BELOW M.L.W.

BREAKWATERS (DESIRED BY LOCAL INTERESTS)

BREAKWATER (ALTERNATE LOCATION)

S1

S2

S4

CURTIS ID.

METCALF PT.

OGIER PT.

WEST PENOBSCOT BAY

N

VICINITY MAP

SCALE OF FEET

1000 0 2000 4000 6000 8000 10000FT.

DILLINGHAM LEDGE

CAMDEN

HARBOR

EATON PT.

CAMDEN HARBOR

NORTHEAST PT.

CURTIS ID.

METCALF PT.

OGIER PT.

WEST PENOBSCOT BAY

ROCKPORT

TRACED FROM U.S.C.&G.S. CHART NO. 310

TYPICAL SECTION-BREAKWATER

SCALE VER. 1"=20'
HOR. 1"=20'

HARBOR SIDE

BAY SIDE

10'

EL. 15'0

M.H.W. EL. 9'6

M.L.W. EL. 0'0

1½

1½

1¼

WIND DIAGRAM FOR PORTLAND, MAINE (1928-1937 INCLUSIVE)

60 MILES PER HOUR

50 " "

40 " "

30 " "

20 " "

N NE E SE S SW W NW

WIND DURATION

MAXIMUM VELOCITY

DAILY

2days 1day 10days 21days 13days 2days 14days 2days

DATA FROM OBSERVATION BY THE U.S. WEATHER BUREAU AT PORTLAND STATION, PORTLAND, MAINE.

LEGEND

MEAN HIGH WATER

MEAN LOW WATER

6-FT. CURVE OF DEPTH

12-FT. CURVE OF DEPTH

18-FT. CURVE OF DEPTH

NOTE: DEPTHS EXPRESSED IN FEET AND TENTHS ARE TAKEN FROM SURVEYS OF AUGUST 1943 AND OCTOBER 1945. ALL OTHER DEPTHS ARE TAKEN FROM U.S.C.&G.S. CHART NO. 321. DEPTHS ARE REFERRED TO THE PLANE OF MEAN LOW WATER.

LOCALITY MAP

SCALE OF MILES

0 10 30 50 70 90 MI.

M.C.

EASTPORT

MAINE

B.E.M.

SEARSPORT BELFAST

CAMDEN ROCKLAND

G.T.

M.C.

NEW HAMPSHIRE

PORTLAND

ATLANTIC OCEAN

BOSTON DISTRICT BOUNDARY

PORTSMOUTH

MASS.

BOSTON

PROVINCETOWN

N.Y.N.H.&H.

CONN.

R.I.

CAMDEN HARBOR
MAINE

SCALE OF FEET

1000 500 0 1000FT.

U. S. ENGINEER OFFICE, BOSTON, MASS. 15 MARCH 1946

APPROVAL RECOMMENDED:
John L. Allen
CHIEF ENGINEERING DIVISION

APPROVED:
COLONEL, CORPS OF ENGINEERS
DISTRICT ENGINEER

SUBMITTED:
H.R. Crichton
SR. ENGINEER

TRANSMITTED WITH REPORT DATED 20 MARCH 1946

NO.	CHARACTER	DATE	APP'D
	REVISIONS		

DES. BY
DR. BY
TR. BY
CH. BY J.N.M.

FILE NO. 1041 D-6-3

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